

**REMARKS**

Claims 1-20 are pending in this application. By this Amendment, claims 1-8 and 10 are amended to correct typographical errors. Additional support for the amended claims can be found in claims 16-20. No new matter is added. In view of the amendments and the following remarks, reconsideration and allowance are respectfully requested.

Entry of the amendments is proper under 37 CFR §1.116 since the amendments: (a) place the application in condition for allowance (for the reasons discussed herein); (b) do not raise any new issue requiring further search and/or consideration (since the amendments merely make typographical corrections); (c) do not present any additional claims without canceling a corresponding number of finally rejected claims; and (d) place the application in better form for appeal, should an appeal be necessary. Entry of the amendments is thus respectfully requested.

**I. Claim Rejection Under §103**

The Office Action rejects claims 1-20 under 35 U.S.C. §103(a) over U.S. Patent No. 6,004,389 to Yatake ("Yatake") in view of U.S. Patent No. 6,048,914 to Goto et al. ("Goto"). Applicants respectfully traverse this rejection.

Claim 1 is directed to an ink composition that includes at least two different types of polyalkylene glycol alkyl ethers, one of which is polypropylene glycol n-butyl ether having three or more oxypropylenes. Yatake and Goto do not teach or suggest such an ink composition.

Yatake describes an ink composition that includes a glycol ether. Yatake's glycol ether refers to: diethylene glycol mono-n-butyl ether, triethylene glycol mono-butyl ether, propylene glycol mono-n-butyl ether, and dipropylene glycol mono-n-butyl ether (col. 3, lines 12-21). Yatake further states that these four glycol ethers effectively prevent bleeding or feathering, and that other glycol ethers cannot reduce or can only slightly reduce bleeding or

feathering. The Office Action acknowledges that Yatake fails to teach a polypropylene glycol n-butyl ether having three or more oxypropylenes, as claimed, and thus relies on Goto to make up for the deficiencies of Yatake.

The Office Action states that Goto teaches an ink composition that includes glycol ethers such as propylene glycol monobutyl ether, dipropylene glycol monobutyl ether and tripropylene glycol monobutyl ether. According to the Office Action, Goto teaches that propylene, dipropylene, and tripropylene glycol monobutyl ether are equivalent. Therefore, the Office Action concludes, it would have been obvious to one of ordinary skill in the art to substitute tripropylene glycol monobutyl ether for the propylene glycol monobutyl ether of Yatake in order to arrive at the ink composition as claimed (i.e., a propylene glycol n-butyl ether having three or more oxypropylenes). Applicants respectfully disagree with this conclusion.

Although Goto includes propylene, dipropylene and tripropylene glycol butyl ethers as possible components of its ink composition, Goto does not teach or suggest that tripropylene glycol n-butyl ether is equivalent to the propylene and/or dipropylene glycol n-butyl ether in the Yatake ink composition. Moreover, contrary to the position stated in the Office Action, and as illustrated in the specification, these butyl ethers are not equivalent. Therefore it would not have been obvious to one of ordinary skill in the art to substitute these components for each other.

**A. The examples prove that propylene, dipropylene and tripropylene glycol butyl ethers are not equivalent.**

In the instant specification, the printing ink composition of Examples 1-14 include tripropylene glycol n-butyl ether, while the printing ink compositions of Comparative Examples 1-14 do not include tripropylene glycol n-butyl ether. In particular, Example 2 includes 1% tripropylene glycol n-butyl ether and 5% propylene glycol n-butyl ether.

Comparative Example 2 includes 6% propylene glycol n-butyl ether. Any art-suggested equivalence between the propylene and tripropylene compounds is disproved by the data shown in Table 29A and Table 30A.

The data show that an ink composition that includes tripropylene glycol n-butyl ether and propylene glycol n-butyl ether performs superior to an ink composition that includes an identical percentage amount of only propylene glycol n-butyl ether. Additional examples illustrating that propylene and tripropylene glycol n-butyl ether are not equivalent substitutes are provided in Examples 6, 11 and 12 and Comparative Examples 6, 11 and 12, and by the data in Tables 29 and 30.

Applicants produced an ink composition that includes at least two different types of polyalkylene glycol alkyl ethers, one of which is polypropylene glycol n-butyl ether having three or more oxypropylenes, and found unexpected and superior results, such as sharp readable printed characters with little or no color bleeding on plain paper. These results are superior and unexpected from the teachings of Yatake and Goto.

**B. The polypropylene glycol n-butyl ethers having three or more oxyalkylenes as claimed are different from the glycol ethers disclosed in Yatake.**

Contrary to the position taken in the Office Action, the physical properties of Applicants' polypropylene glycol n-butyl ether having three or more oxyalkenes significantly differ from the properties of dipropylene glycol n-butyl ether, propylene glycol n-butyl ether, and triethylene glycol monobutyl ether used in the Yatake ink. Applicants submit herewith Product Information sheets for the ether compounds listing important physical properties relevant to their use in an ink composition. For at least the following reasons, the claimed ink composition is not taught or suggested by any combination of Yatake and Goto.

First, as shown in the Product Information sheets, polyethylene glycol butyl ethers, like diethylene glycol mono-n-butyl ether or triethylene glycol mono-n-butyl ether disclosed

in Tatake, possess 100% solubility in water. However, polypropylene glycol butyl ethers, like tripropylene glycol n-butyl ether featured in the claimed composition, are less than 100% soluble and separate from water. For example, when 3.0 to 91.5 % by weight of the tripropylene glycol n-butyl ether is contained in a mixture of tripropylene glycol n-butyl ether and water, the tripropylene glycol n-butyl ether separates from water. As a result of the wide content range of the tripropylene glycol n-butyl ether, the moisture content of the ink is reduced due to drying occurring at a portion where an ink dot contacts a sheet. Thus, the tripropylene glycol n-butyl ether separates from water, thereby speeding up the penetration of tripropylene glycol n-butyl ether. Accordingly, the ink dot can be quickly formed and fixed on the sheet. After that, the ink dot sufficiently permeated in the sheet becomes resistant to bleeding.

Second, the vapor pressures of the polypropylene glycol n-butyl ethers having three or more oxypropylenes as claimed are different from the vapor pressures of propylene glycol n-butyl ether and dipropylene glycol n-butyl ether taught by Yatake. For example, the steam pressure (20°C) of propylene glycol n-butyl ether is 0.85 mmHg, and the steam pressure (20°C) of dipropylene glycol n-butyl ether is 0.04 mmHg, whereas the steam pressure (20°C) of tripropylene glycol n-butyl ether is < 0.01 mmHg. Because of the low vapor pressure, the tripropylene glycol n-butyl ether, contained in an ink composition, does not evaporate after the ink contacts the sheet. In addition, the polypropylene glycol n-butyl ethers having three or more oxypropylenes as claimed can effectively prevent bleeding even when they are present in a low ink concentration.

### **C. Summary**

The data provided in the Product Information sheets, and the data already contained within the specification itself, demonstrates that contrary to the position taken in the Office Action, propylene, dipropylene and tripropylene glycol butyl ethers are not equivalent ink

composition components. Applicants claimed ink composition featuring a polypropylene glycol n-butyl ether having three or more oxypropylenes produces an ink composition having unexpected and superior results, such as sharp readable printed characters with little or no color bleeding on plain paper that are not taught or suggested by Yatake and Goto.

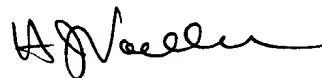
Thus, Yatake and Goto do not teach or suggest, and would not have rendered obvious to one of ordinary skill in the art, the claimed ink composition. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection.

## **II. Conclusion**

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-20 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Enclosures:

Product Information sheets

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